

Applicati n No.: 09/761,923

Docket N .: JCLA6211

REMARKS**Present Status of the Application**

Claims 1-15 remain pending of which claims 1 and 8-12 have been amended for providing clarification. This Amendment is promptly filed to place the above-captioned case in condition for allowance. No new matter has been added to the application by the amendments made to the claims, specification or otherwise in the application. For at least the following reason claims 1-15 are proper condition for allowance. A notice of allowance is respectfully solicited.

Response to Rejections under 35 U. S. C. 103

1. *The Office Action rejected claims 1-15 under 35 U.S.C. 103(a) as being unpatentable over Liu et al. (US-6,326,300, hereinafter Liu) in view of Violette et al. (US-6,140,244, hereinafter Violette).*

In rejecting the above claims, the Office Action stated that Liu discloses all of the features of the claimed invention except performing a chemical vapor etching step with HF on the masked undoped dielectric layer to remove the implanted/doped region having a depth that does not exceed a thickness of the undoped dielectric layer. However, The Office Action relied on Violette for teaching the step of performing a chemical vapor etching step with HF to remove the implanted/doped region 18 having a depth that does not exceed a thickness of the undoped dielectric layer 16.

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The Office Action considers that Liu's selectively ion implanted blanket first dielectric layer 12 reads on a doped dielectric layer. The Office Action further alleged that the second undoped dielectric layer 22 of Liu is in direct contact/formed on the first dielectric layer 12, although the second undoped dielectric layer 22 is formed on the etch stop layer 14.

Applicants respectfully disagree and traverse the above rejections as set forth below. Independent claim 1 has been amended and is thus allowable over Liu and Violette for at least reason that both Liu and Violette failed to teach, suggest or disclose every features of the claimed invention.

More specifically, Liu and Violette failed to teach, suggest or disclose at least the steps of "performing a chemical vapor etching step with the mask on the undoped dielectric layer to remove the doped region, thereby forming a second opening in the undoped dielectric layer, wherein the second opening exposes a portion of the undoped dielectric layer below the doped region" and "performing a dry etching step with the mask on the undoped dielectric layer, so that the portion of the undoped dielectric layer below the doped region and a portion of the doped dielectric layer below the second opening are removed to expose a portion of the substrate".

Liu discloses using the second etching plasma 28, which etches sequentially the ion implanted region of the selectively ion implanted blanket second dielectric layer 22' and then the ion implanted region of the selectively ion implanted blanket first dielectric layer 12' (col.11, lines 26-32). Liu merely discloses, after the ion implantation step 26, performing one etching step 28 etching the ion implanted regions of the second dielectric layer 22' (for forming trench 23) and the first dielectric layer 12' (for forming via 13). Obviously, Liu does to teach or suggest two

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different etching steps after the ion implantation step 26 for etching the second dielectric layer 22' and the first dielectric layer 12', but merely one etching step 28. On the contrary, the present invention teaches performing one chemical vapor etching step and one dry etching step after the ion implantation step. Therefore, it is implausible for Liu to suggest or teach the features emphasized above.

Similarly, Violette merely discloses phosphorous implanted selected portion 18 of silicon dioxide layer 16 and etching in an HF based etchant for removing the selected portion 18. However, Violette fails to remedy deficiencies of Liu, because Violette does not teach or suggest the lacking features emphasized above, especially "performing a chemical vapor etching step **with the mask** on the undoped dielectric layer to remove the **doped** region, thereby forming a second opening in the undoped dielectric layer". In fact, Violette teaches removing the undoped portions 20 of silicon oxide layer 16, as shown in Fig. 6.

In fact, neither Liu nor Violette recognized the advantages of the present invention. In the present invention, the lateral etching rate for the doped region is relatively reduced by using the chemical vapor etching having a greater etching rate for the doped region than the undoped region, and a straight profile is obtained through the etching. Moreover, the chemical vapor etching has a low etching rate for the mask and high etching selectivity of the dielectric layer relative to the mask. Hence, by way of using the chemical vapor etching in combination of the dry etching procedure, the mask loss during etching is reduced. **With only one photomask**, the two-stage etching process including the chemical vapor etching and the dry etching procedure is performed to form openings.

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Because both Liu and Violette fail to teach, suggest or disclose each and every feature of the present invention, and therefore they cannot possibly arrive the claimed invention, as suggested by the Office Action. Accordingly, Applicants respectfully submit that amended independent claim 1 patentably distinguishes over Liu or Violette. Further, since other claims 2-15 depend from claim 1, therefore claims 2-15 also patently define over Liu and Violette for the same reasons as discussed above.

Reconsideration and withdrawal of these rejections are respectfully requested.

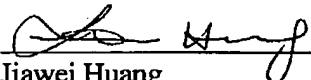
CONCLUSION

For at least the foregoing reasons, it is believed that all pending claims 1-15 are in proper condition for allowance. If the Examiner believes that a conference would be of value in expediting the prosecution of this application, he is cordially invited to telephone the undersigned counsel to arrange for such a conference.

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Respectfully submitted,
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